VORTEX®

VIPER® PST

PRECISION
SHOOTING
TACTICAL

SECOND FOCAL PLANE RIFLESCOPES

Owner's Manual

6–24x50 Riflescopes

4–16x50 Riflescopes

VORTEX® VIPER® PST

Specifically designed for the military, law enforcement and committed precision shooting communities, the Viper® PST Series riflescopes offer the highest levels of performance and reliability. With features such as matched turret/reticle subtensions, CRS zero stop mechanisms and precision ranging reticles, the Viper PSTs are ready for any situation.

This Viper PST riflescope uses a second focal plane reticle. This style of reticle always maintains the identical visual size regardless of magnification. The advantage to this style of reticle is that it will not become too large and "heavy" at high magnifications.

Features 2

Adjustments 3

Mounting 12

Maintenance 20

Troubleshooting 21

Vortex Service and Repair Policy 22

VORTEX®
VIPER® PST

The Vortex Viper PST Riflescope

Dual Use: Shooting Tactical / Hunting

Riflescope Adjustments

Reticle Focus

Vortex Viper PST riflescopes use a *fast focus* eyepiece designed to quickly and easily adjust the focus on the riflescope's reticle.

Adjust the reticle focus

To adjust the reticle focus:

1. Look through the riflescope at a blank white wall or up at the sky.
2. Turn the eyepiece focus knob in or out until the reticle image is as crisp as possible.

Note: *Try to make this particular adjustment quickly, as the eye will try to compensate for an out-of-focus reticle.*

Once this adjustment is complete, it will not be necessary to re-focus every time you use the riflescope. However, because your eyesight may change over time, you should re-check this adjustment periodically.

Warning

Looking directly at the sun through a riflescope, or any optical instrument, can cause severe and permanent damage to your eyesight.

Windage and Elevation Adjustments

Vortex Viper PST riflescopes incorporate precision finger adjustable elevation and windage dials with audible clicks.

To make adjustments:

1. Turn the adjustment knob in the appropriate direction: Up/Down or Left/Right as indicated by the arrows.

2. Move the knobs in the direction you wish the bullet's point-of-impact to change.

MOA or MRAD

Depending on which version you have purchased, your Viper PST riflescope will feature adjustments scaled in MOAs or mrads. If you are unsure of which scale is used, reference the top of the adjustment turret.

If the adjustment is in MOAs, the turret will display "1 Click = ¼ MOA".

If the adjustment is in mrads, the turret will display "1 click = .1 mrad".

Both minute-of-angle (MOA) and milliradian (mrad) unit of arc scales are effective when using subtension measurements for ranging and bullet trajectory drop compensation in reticles.

MOA Adjustments

MOA unit of arc measurements are based on degrees and minutes. There are 360 degrees in a circle, 60 minutes in a degree for a total of 21,600 minutes in a circle. A minute of angle will subtend 1.05 inches at a distance of 100 yards. Viper PST second focal plane riflescopes (except PST 1–4x24) with MOA adjustments use 1/4-minute clicks which subtend .26 inches at 100 yards, .52 inches at 200 yards, .78 inches at 300 yards, etc.

Example: *With each click of the Viper PST moving the point-of-impact 1/4 MOA, it will take four clicks of the knob to move a bullet's point-of-impact 1.05 inches at a 100 yard sight-in distance.*

MRAD Adjustments

Mrad unit of arc measurements are based on the radian. A radian is the angle subtended at the center of a circle by an arc that is equal in length to the radius of the circle. There are 6.283 radians in all circles and 1000 milliradian in a radian for a total of 6283 milliradians (mrads) in a circle. An mrad will subtend 3.6 inches at a distance of 100 yards. Viper PST second focal plane riflescopes (except PST 1–4x24) with mrad adjustments use .1 mrad clicks which subtend .36 inches at 100 yards, .72 inches at 200 yards (2 cm at 200 meters), 1.08 inches at 300 yards (3 cm at 300 meters), etc.

Example: *With each click of the Viper PST moving the point-of-impact .1 mrad (.36 inches), four clicks will move the bullet's point-of-impact 1.44 inches at a 100 yard sight-in distance. At 100 meters, four clicks will move the point-of-impact four centimeters.*

Parallax Adjustment

This model of the Viper PST riflescope uses a side focus parallax adjustment which, when properly set, eliminates parallax errors.

Adjust the side parallax knob

Parallax is a phenomenon that results when the target image does not quite fall on the same optical plane as the reticle within the scope. When the shooter's eye is not precisely centered in the eyepiece, there can be apparent movement of the target in relation to the reticle, which can cause a small shift in the point of aim. Parallax error is most problematic for precision shooters using high magnification.

To set the parallax:

1. Be sure the reticle is correctly focused (see *Reticle Focus*).

2. As accurately as possible, match the yardage number (distance you are shooting) on side focus parallax adjustment knob to the indicator arrow on the scope body.

3. Check the setting for accuracy by moving your head back and forth while looking through the scope. The setting is correct if there is no apparent movement between the reticle and target. If there is apparent movement, adjust the focus knob slightly until the movement is eliminated.

4. When properly set, the target image should be sharp and crisp.

Customizable Rotational Stop (CRS)

Vortex Viper PST riflescope elevation turrets incorporate the unique ***CRS*** rotation stop feature. After the rifle is sighted in, the design of the CRS allows a shooter to quickly and easily return to an original zero point when using the elevation turret to dial-in temporary bullet drop corrections.

The CRS feature is particularly useful when dialing large multi-revolution elevation corrections. Without this feature, the shooter must pay very careful attention when dialing these large corrections. If the shooter loses track of the number of revolutions, the original zero point may become lost when returning the adjustment. Viper PST riflescopes equipped with the CRS allow the elevation dial to be quickly spun back to original zero without having to carefully count revolutions or clicks.

Once the CRS shims are installed after sight-in, the elevation dial will stop turning shortly past the original zero point when being returned (turning clockwise direction) from a temporary elevation adjustment. The shooter can then turn the elevation knob a partial turn in a counter-clockwise direction until the zero reference and radius bar are correctly aligned—achieving the original zero point.

See CRS shim installation in the Bore Sighting and Final Range Sight-in sections.

CRS Shims

Variable Power Adjustments

To change magnifications, turn the magnification ring to the desired level. The patented Vortex ***MagView*** will provide a low light reference for magnification level.

The Viper PST 4–16x50 and 6–24x50 riflescopes with second focal plane reticles use a dual number marking system on the magnification dial. The 1x, 2x, 3x, and 4x subtension multiplier markings on the back side of the magnification numbers can be used in conjunction with the reticle to help calculate distances and holdovers at varying magnifications.

Magnification and Subtension

The MOA or mrad subtensions listed in the reticle manual are only valid at the highest magnification of the riflescope—marked 1x on the subtension multiplier scale. However, by understanding the relationship of magnification and subtensions, the shooter can still easily calculate ranging, holdovers and wind drift at partial magnifications (2x, 3x and 4x markings).

- If magnification is set at half of the full magnification, subtension values will be two times the spec listed in the manual.
- If magnification is set at a third of the full magnification, subtension values will be three times the spec listed in the manual.
- If magnification is set at a quarter of the full magnification, subtension values will be four times the spec listed in the manual.

Subtension Changes with Magnification

Model	Riflescope Magnification	Reticle Multiplier	Actual Subtension of 1 mrad Reticle Space	Actual Subtension of 2 MOA Reticle Space
4–16x50 Reticle subtensions valid at 16x	16x	1x	1 mrad	2 MOA
	8x	2x	2 mrads	4 MOAs
	5.3x	3x	3 mrads	6 MOAs
	4x	4x	4 mrads	8 MOAs
6–24x50 Reticle subtensions valid at 24x	24x	1x	1 mrad	2 MOA
	12x	2x	2 mrads	4 MOAs
	8x	3x	3 mrads	6 MOAs
	6x	4x	4 mrads	8 MOAs

Turret Rotation

Vortex Viper PST riflescopes incorporate Vortex's patented ***Radius Bar*** to visually assist in keeping track of turret rotations. The radius bar provides a quick visual reference that allows the shooter to confirm:

- Knob orientation is correct and has not shifted as a result of accidental contact.
- Knob orientation is at the zero point when using the CRS feature.
- By watching the position of the bar while making elevation adjustments, the shooter is able to quickly track full, half and quarter rotations.

To get these benefits from the Radius Bar, the "0" mark on the turret must be indexed with the zero reference line on turret post. See the section on *Setting the CRS Stop and Indexing Elevation Knob*.

Illumination Adjustments

The Vortex Viper PST riflescopes use a variable intensity reticle illumination system to aid in low light performance. The adjustment knob is located on the left side of the scope's eyepiece.

To activate the illumination, rotate the adjustment knob in either direction. The illumination knob allows for 10 levels of brightness intensity with an ***off*** click between each level. This feature allows the shooter to turn off the illumination and return to a favored intensity level with just one click.

Replacing the Illumination Battery

1. Unscrew the outer cap with a coin.
2. Remove the battery.
3. Replace with a new CR2032 battery.

Riflescope Mounting

To get the best performance from your Vortex Viper PST riflescope, proper mounting is essential. Although not difficult, the correct steps must be followed. If you are unsure of your abilities, it would be best to use the services of a qualified gunsmith.

Centering of the Reticle

The Vortex Viper PST riflescope is pre-set from the factory with the reticle in the center of the adjustment ranges.

If you have changed the settings and wish to approximately reset the reticle to the center, this can be done easily:

1. Turn the windage or elevation dial as far as possible in either direction. *Do not force the dial. As soon as any any resistance is felt, stop turning.*

2. Carefully count the dial rotations while turning the dial back in the opposite direction. *Stop turning as soon as resistance is felt.*

3. Turn the dial the other direction to half the amount of rotations counted in step one.

Complete this procedure for both windage and elevation dials to approximately center the reticle.

Rings and Bases

Mount an appropriate base and matching rings to your rifle according to the manufacturer's instructions. The Vortex Viper PST riflescopes require 30mm rings.

Vortex Optics highly recommends using the Vortex Optics Precision Matched 30mm ring sets which may be purchased from an authorized Vortex riflescope dealer. These rings will mount to any Picatinny spec base.

Note: *If shooting at distances in excess of 800 yards with 4–16x50 or 6–24x50 models, Vortex Optics recommends use of a 20 MOA canted Picatinny rail or 30mm rings with adjustable offsets. These can be purchased through companies such as Badger Ordnance, Barrett Mfg., EGW, Burris, and others.*

If using an aftermarket base and ring setup, use the lowest ring height that will provide complete clearance of scope and rifle—avoiding any contact with barrel, receiver, bolt handle or any other part of the rifle. A low mounting will help assure proper cheek weld, aid in establishing a solid shooting position, and promote fast target acquisition.

Eye Relief and Reticle Alignment

After installing the bottom ring halves on the mounting base, place the riflescope on the bottom ring halves and loosely install the upper ring halves. Before tightening the scope ring screws, adjust for maximum eye relief to avoid injury from recoil:

1. Set the riflescope to the middle of its magnification range.

2. Slide the riflescope as far forward as possible in the rings.

3. While viewing through the riflescope in a normal shooting position, slowly slide the riflescope back towards the shooter's face—paying attention to the field of view. *Just as the full view is visible, stop.*

4. Without disturbing the front-back placement, rotate the riflescope until the vertical crosshair exactly matches the vertical axis of the rifle. Use of a reticle leveling tool, a weight hung on a rope, or an adjustable set of feeler gauges will help with this procedure.

5. After aligning the reticle, tighten and torque the ring screws down per the manufacturer's instructions.

Use of an adjustable set of feeler gauges between a one-piece base and flat bottom section of the riflescope to square the riflescope (and reticle) to the base.

Bore Sighting

Initial bore sighting of the riflescope will save time and money at the range. This can be done by using a mechanical or laser bore sighter according to the manufacturer's instructions or by removing the bolt and sighting through the barrel on some rifles.

To visually bore sight a rifle:

1. Place the rifle solidly on a rest and remove the bolt.

2. Sight through the bore at a target approximately 100 yards away.

3. Move the rifle and rest until the target is visually centered inside the barrel.

4. With the target centered in the bore, make windage and elevation adjustments until the reticle crosshair is also centered over the target.

Visually bore-sighting a rifle.

Final Range Sight-In and CRS Stop Set

After the riflescope has been bore-sighted, final sight-in and CRS stop set should be done at the range using the exact ammunition expected to be used while shooting. Sight in and zero the riflescope at the preferred distance. 100 yards is the most common zero distance, although a 200 yard zero may be preferred for long range applications.

Be sure the reticle is in focus (see *Reticle Focus* section) and set the parallax adjustment to match the distance being used for sight-in:

1. Following all safe shooting practices, fire a three-shot group as precisely as possible.

2. Next, adjust the reticle to match the approximate center of the shot group (see section on *Windage and Elevation Adjustment*).

Note: *If the rifle is very solidly mounted and cannot be moved, simply look through the scope and adjust the reticle until it is centered on the fired group.*

3. Carefully fire another three-shot group and see if the bullet group is centered on the bullseye.

This procedure can be repeated as many times as necessary to achieve a perfect zero.

Setting the CRS Stop and Indexing Elevation Knob

After obtaining a satisfactory zero, the CRS stop can be set if desired:

1. Loosen the three turret cap retaining screws on the elevation turret. Gently pull the turret cap straight up and off of the turret post, being careful not to rotate the turret post.

2. Slide the CRS shims on the center section of the turret post below the V-grooved part.

Alternate shim installation direction 180 degrees with each shim.

Use as many shims as necessary to completely fill up the space. Do not try to force in a last shim once the clearance is very close—a tiny remaining gap is normal.

1. After filling the center gap on the post with shims, replace the elevation cap.

2. Align the turret cap so the "0" mark on the cap matches up with the "0" reference line on the turret post. Again, be sure not to rotate the actual turret mechanism in the process.

3. Re-tighten the retaining screws, but do not overtighten. Use of thumb and forefinger on the short end of the hex wrench will provide sufficient force.

Align the elevation turret cap.

Indexing the Windage Knob

1. Loosen the three retaining screws on windage turret cap.

2. Carefully rotate the cap until the "0" mark on the cap matches up with the "0" reference line on the turret post. Be sure that the cap is freely turning and that you don't rotate the actual turret mechanism.

3. Re-tighten the windage knob retaining screws, but do not overtighten. Use of thumb and forefinger on the short end of the hex wrench will provide sufficient force.

Once the windage and elevation knobs are correctly indexed to the zero mark, temporary corrections can be safely dialed into the scope without worry of losing the original zero.

Align the windage turret cap.

Using the CRS Zero Stop

Once the CRS shims are installed, the elevation dial will stop turning shortly past the original zero point when being returned (turning clockwise direction) from a temporary elevation adjustment.

Point at which the knob stops turning.

Turn the elevation knob a partial turn in a counter-clockwise direction until the Radius Bar is correctly aligned with scope axis and zero marks match. This setting will match the original zero point.

Correct alignment for zero point.

If re-zeroing at a future time, be sure to remove all CRS shims before sight-in.

Maintenance

Cleaning

The fully waterproof and fogproof Vortex Viper PST riflescope requires very little routine maintenance other than periodically cleaning the exterior lenses. The exterior of the scope may be cleaned by wiping with a soft, dry cloth.

When cleaning the lenses, be sure to use products, such as the Vortex Fog Free cleaning products or Lens Pen, that are specifically designed for use on coated optical lenses.

- Be sure to blow away any dust or grit on the lenses prior to wiping the surfaces.
- Using your breath, or a very small amount of water or pure alcohol, can help remove stubborn things like dried water spots.

Lubrication

All components of the Vortex Viper PST riflescopes are permanently lubricated, so no additional lubricant should be applied.

Note: *Other than to remove the turret caps, do not attempt to disassemble any components of the riflescope. Disassembling of riflescope may void warranty.*

Storage

If possible, avoid exposing your Vortex riflescope to direct sunlight or any very hot location for long periods of time.

Troubleshooting

Sighting-in Problems

Many times, problems thought to be with the scope are actually mount problems. Be sure the mounts are tight to the rifle and the scope is secured so it doesn't twist or move in the rings.

An insufficient windage or elevation adjustment range may indicate problems with the base mount, base mount holes drilled in the rifle's receiver, or barrel/receiver alignment.

Check for Correct Base and Ring Alignment

1. Re-center the scope reticle (see *Centering of the Reticle*).
2. Attach bore sighter, or remove bolt and visually boresight rifle.
3. Look through the scope. If the reticle appears way off center on the boresighter image or when compared to the visually centered target when looking through rifle's bore, there may be a problem with the bases or rings being used. Confirm that correct base and rings are being used—and in the proper orientation.

Grouping Problems

There are many issues that can cause poor bullet grouping.

- Maintain a good shooting technique and use a solid rest.
- Check that all screws on rifle's action are properly tightened.
- Be sure rifle barrel and action are clean and free of excessive oil or copper fouling.
- Check that rings are correctly torqued per the manufacturer's instructions.
- Some rifles and ammunition don't work well together—try different ammunition and see if accuracy improves.

VORTEX®
VIPER® PST

Vortex Service and Repair Policy

Unconditional Lifetime Warranty

Vortex Optics wants you to shoot and use your Viper PST riflescope under any conditions with complete confidence—that's why our warranty is straightforward and simple:

- Fully transferable
- No warranty card needed
- No receipt needed

Unconditional Lifetime Warranty

Rest assured, if this riflescope should ever require repair, all you need to do is contact Vortex for absolutely free service. Call 800-426-0048 or e-mail service@vortexoptics.com.

Vortex Optics
2120 West Greenview Drive
Middleton, Wisconsin 53562
USA

Patents Pending on MagView System, Radius Bar
Dual Use: Shooting Tactical / Hunting

VORTEX®
THE FORCE OF OPTICS™

www.vortexoptics.com

Manual #2-P